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RADIATION SUPPRESSION OF SUPERCONDUCTING QUANTUM BITS USING A CONDUCTIVE PLANE [NIST Docket 13-002]

This invention relates to superconducting quantum circuits, and more specifically to two-dimensional fabrication of a quantum circuit.

Abstract

<p>We present a superconducting qubit design that is fabricated in a 2D geometry over a super-conducting ground plane to enhance the lifetime. The qubit is coupled to a microstrip resonator for readout. The circuit is fabricated on a silicon substrate using low loss, stoichiometric titanium nitride for capacitor pads and small, shadow-evaporated aluminum/aluminum-oxide junctions. We observe qubit relaxation and coherence times (T_1 and T_2) of $11.7 \pm 0.2 \mu\text{s}$ and $8.7 \pm 0.3 \mu\text{s}$, respectively. Calculations show that the proximity of the superconducting plane suppresses the otherwise high radiation loss of the qubit. A significant increase in T_1 is projected for a reduced qubit-to-superconducting plane separation.</p>

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Related Items

- Journal Publication

Status of Availability

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